Gamma HW

DO NOT LOSE THIS PACKET

Algebra 1B **Name:**
Final Exam Study Guide #1 **Date:**

Part 1: Vocabulary and Written Response

Ex $2x+3=7$ $2x^2+5x-6=0$

1. What is a *solution* to a single variable equation?

It is a value that makes the equation true!

2. What is a *solution* to a *linear* equation?

It is an x-value that makes the equation true!
There is only one solution!

3. What is a *solution* to a *system of linear equations*?

A coordinate pt. that makes both equation true!
· intersection · (x, y)

4. What is a *solution* to a *system of linear* **inequalities**?

There are infinite solutions! They make the inequality true! We use shading!

5. What are the other names for a "solution" to a *quadratic* equation?

zeroes / x-intercepts / roots
one, two or no solutions.

* 6. Fill in the table below.

	Defining Features	Equation	Graph
Linear Functions		$y=mx+b$ $y-y_1=m(x-x_1)$ $Ax+By=C$	

Exponential Functions			
Quadratic Functions			

Part 2: Writing Equations

Linear Equations:

1. What is the basic form of a linear equation? $y = mx + b$

2. What makes two lines parallel to each other? same slope!

3. How do you calculate the slope/rate of change of a line when all you have is two points?

$\frac{y_2 - y_1}{x_2 - x_1}$

4. Write a slope-intercept form equation for a line that has a y-intercept of two and a slope of negative five.

$y = -5x + 2$

* 5. Write a slope-intercept form equation for the line that passes through (2, -3) and (5, 6).

Slope

(2, -3) (5, 6)

$\frac{6-(-3)}{5-2} = \frac{9}{3}$

$m = 3$

We have points...

$y - y_1 = m(x - x_1)$

$y - (-3) = 3(x - 2)$

$y + 3 = 3x - 6$
$-3 \quad -3$

$y = 3x - 9$

* 6. Write a slope-intercept form equation for the line that passes through (3, -2) and is parallel to the line: $y = -5x + 1$

slope!

Parallel : same slope!

$m = -5$

point: (3, -2)

$y - (-2) = -5(x - 3)$

$y + 2 = -5x + 15$

$y = -5x + 13$

7. Write a slope-intercept form equation for the line that passes through (1, 8) and is perpendicular to the line: $y = \frac{1}{3}x + 2$

$y = -3x + b$

$y - 8 = -3(x - 1)$

$y - 8 = -3x + 3$

$y = -3x + 11$

Exponential Equations:

1. What is the basic form of an exponential equation, and what do each of the variables represent?

$y = ab^x$

* 2. What makes an exponential equation one of exponential *growth* and what makes it an equation of exponential *decay*?

$b > 1$ is growth $0 < b < 1$ is decay

3. Write an exponential equation in which the initial value is eight and the growth factor is three.

$y = 8 \cdot 3^x$

* 4. Write an exponential equation for the following scenario:
A population of rabbits has 1,250 male rabbits. The male rabbit population is doubling every month.

$y = 1250(2^x)$

You have $10 in your bank account and it's tripling every month.

$y = 10(3)^x$

The value of your music collection is $100 now but its value is being cut in half every year.

$y = 100\left(\frac{1}{2}^x\right)$

Quadratic Equations:

1. What is the standard form of a quadratic equation, and how does each variable affect the graph of the quadratic equation?

$y = ax^2 + bx + c$ y-int!

\+ −

2. Write the "parent" quadratic equation: $y = x^2$

Picture
3. ~~Write the equation~~ for a parabola that has no real solutions:

Picture
4. ~~Write the equation~~ for a parabola that has one real solution:

Picture
5. ~~Write the equation~~ for a parabola that has two real solutions:

6. Write the equation for a parabola that opens up: a is positive $2x^2 + 3$

7. Write the equation for a parabola that opens down: a is neg. $-x^2 + 2x - 3$

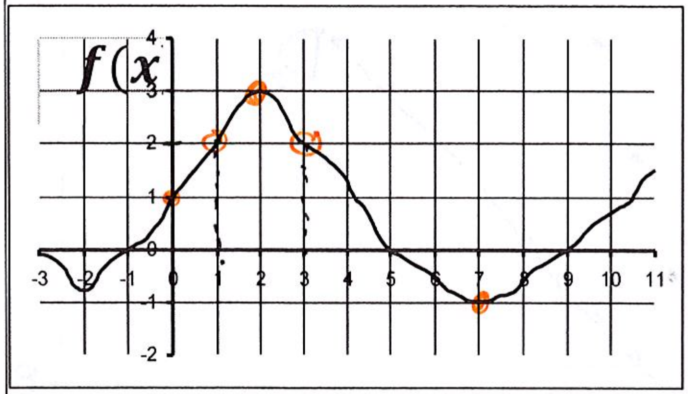
8. Write the equation for a parabola that has x-intercepts of 5 and -2: $f(x) = (x-5)(x+2)$

9. Write the equation for a parabola that has a y-intercept of -17: $3x^2 + 200x - 17$

Part 3: Function Notation

Use the graph of f(x) and the equation g(x) to find the following values.

*

	$g(x) = 3x^2 - 6$
$f(2) =$ 3	$g(2) =$ 6
$f(7) =$ −1	$g(-3) =$ 21
the value of x when $f(x) = 2$? y! x=1 x=3	$g(f(0)) = g(1) = -3$

Part 4: Graphing

1. How do you graph a linear equation when it is in slope-intercept form?

① Plot y-int.

② Rise & run!

2. How do you graph a linear equation when it is in standard form?

① Convert to $y=mx+b$

* divide everything!

② Graph

$$5x + 4y = 20$$
$$\frac{4y}{4} = \frac{20 - 5x}{4}$$
$$y = 5 - \frac{5}{4}x$$

10. Graph the following linear equations. You must NAME and EXTEND your lines.

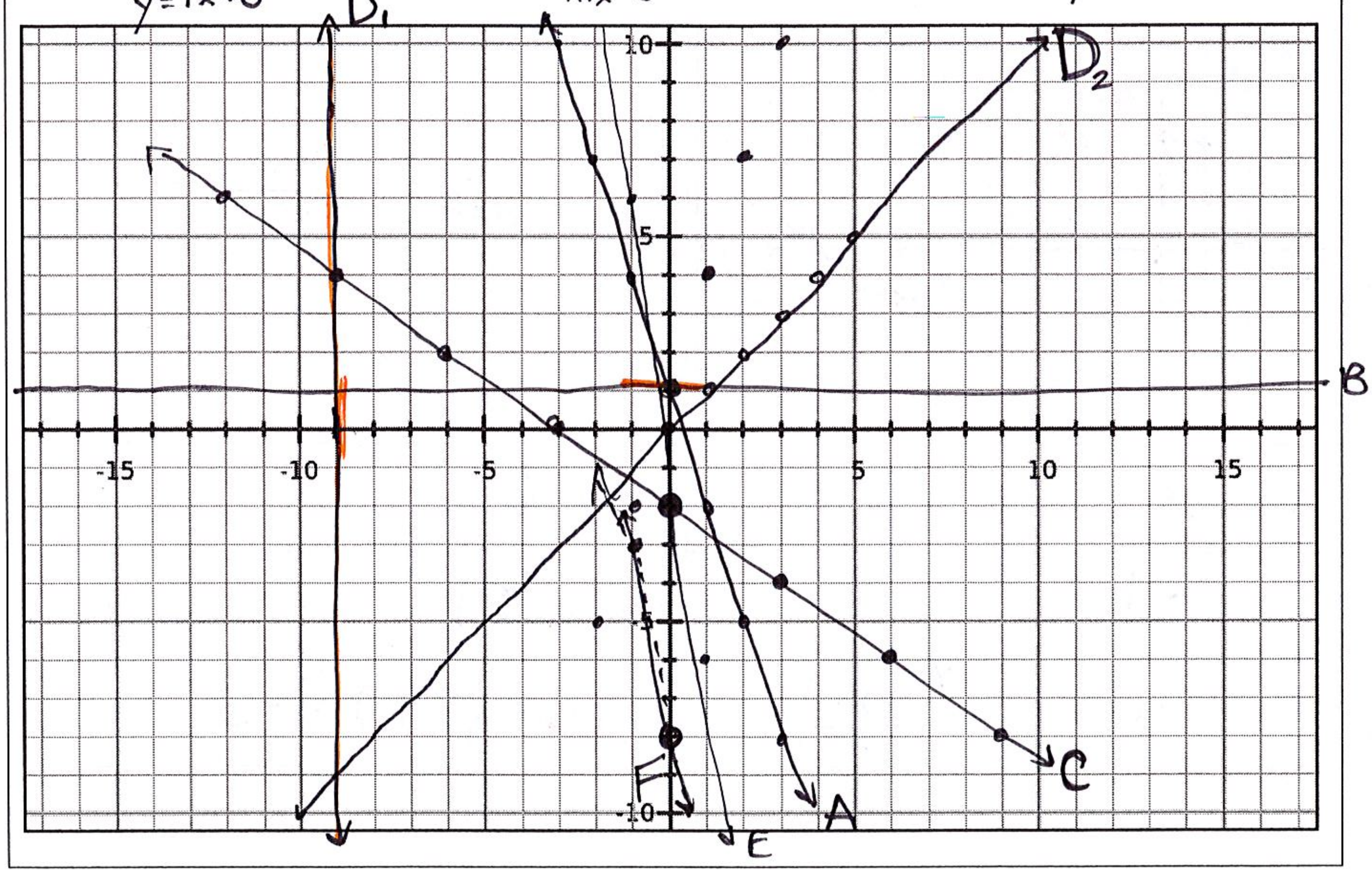
Ⓒ $\frac{-3y}{-3} = \frac{6+2x}{-3}$

$y = -2 - \frac{2}{3}x$

* A) $y = -3x + 1$ B) $y = 1$ C) $-2x - 3y = 6$ D) $x = -9$

D) $y = x$ E) $y = -6x$ F) $5x + y = -8$ $\longrightarrow$ $y = -8 - 5x$

$y = 1x + 0$ $mx + 0$



3. How do you graph a *linear inequality*?

Shading the true side!

4. How is the solution set to a linear inequality with a < sign different from the solution set to the same inequality with a ≤ ?

Use a - - - line with <.

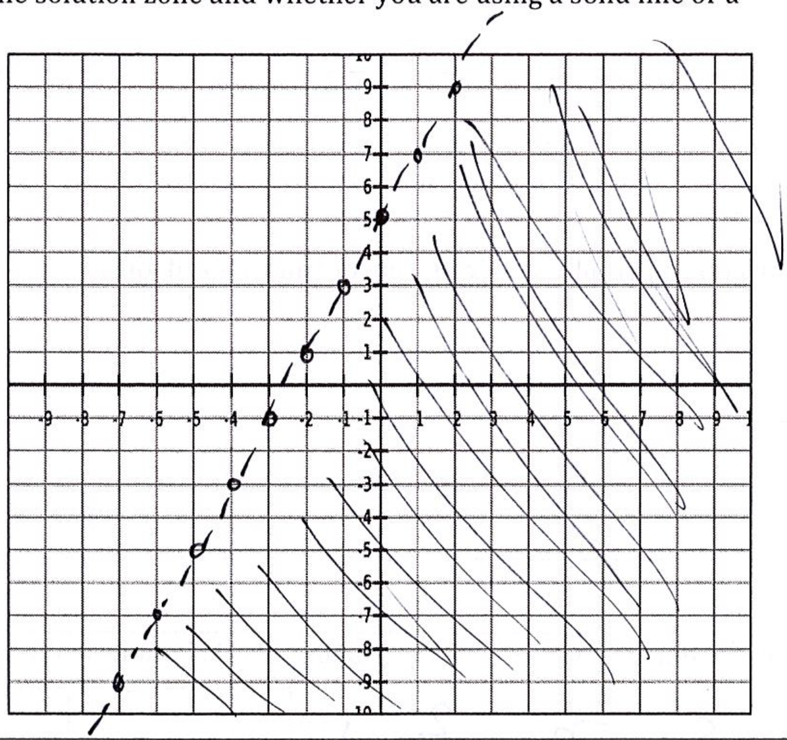
Use a —— line with ≤

5. Can a system of linear inequalities have *no solution*? Explain.

If the shaded regions don't cross, there is no solution. This happens when the lines are parallel.

6. Graph the inequality. Clearly show the solution zone and whether you are using a solid line or a dashed line.

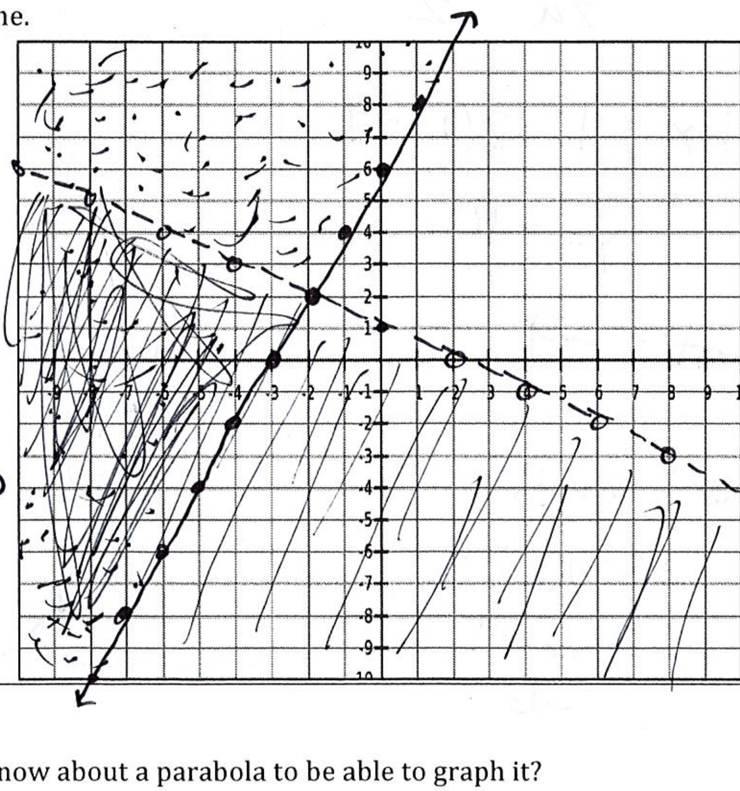
$y < 2x + 5$



Graph the system of inequalities to show the solution to the system. Be sure to clearly show dashed/solid lines, and clearly mark the solution zone.

$$\begin{cases} y < -\frac{1}{2}x + 1 \\ y \geq 2x + 6 \end{cases}$$

Both overlap!



7. What are the two things you need to know about a parabola to be able to graph it?

8. How do you graph a quadratic function in standard form?

9. How do you graph a quadratic function in factored form?

Graph the function $y = x^2 - 2x - 9$. Show all calculations in the space provided.

A.o.S. $x = \frac{-b}{2a} = \frac{2}{2} = 1$

Vertex $1^2 - 2(1) - 9$

$y = -10$

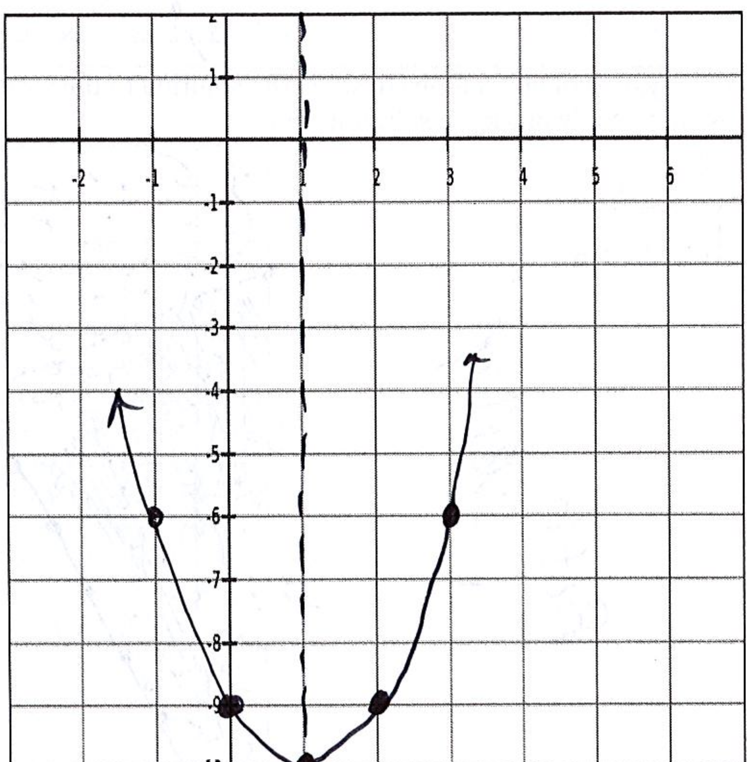
y-int: -9

Other: $x = 3$

$3^2 - 2(3) - 9$

$9 - 6 - 9$

-6



Graph the function $y = 3(x+1)(x-3)$. Show all calculations in the space provided.

X int!

A.o.S. Middle!

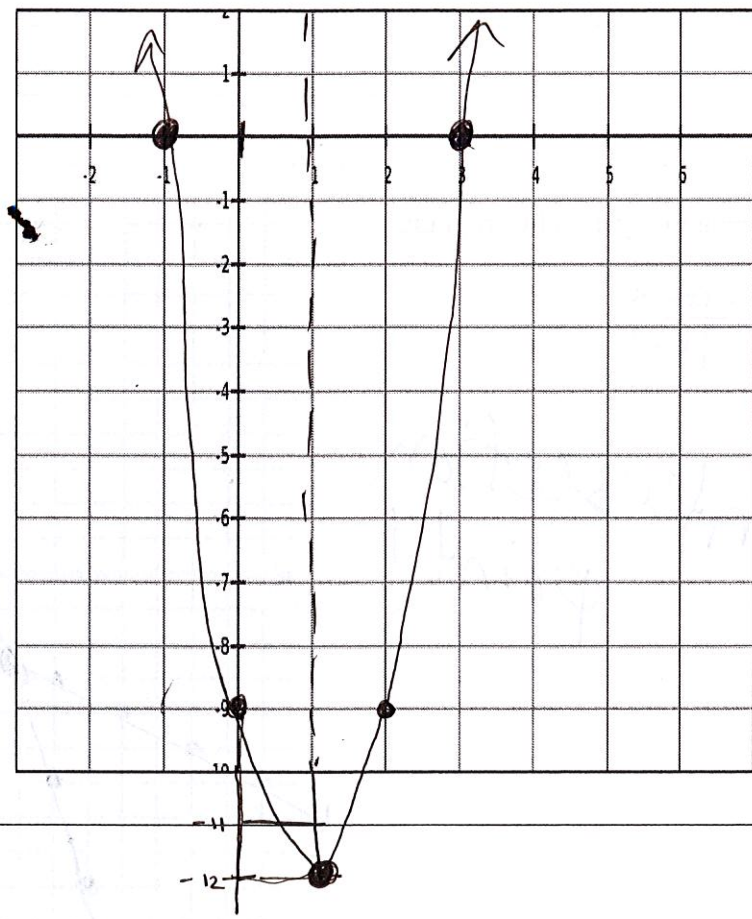
$x = 1$

Vertex!

$3 \cdot (1+1)(1-3)$

$3 \cdot 2 \cdot -2$

-12



Part 5: Systems of Linear Equations

1. What are the three main ways to solve a system of linear equations?

   (1) ______________________________

   (2) ______________________________

   (3) ______________________________

2. How can a system of linear equations have *no solution?*

3. How can a system of linear equations have *one solution*?

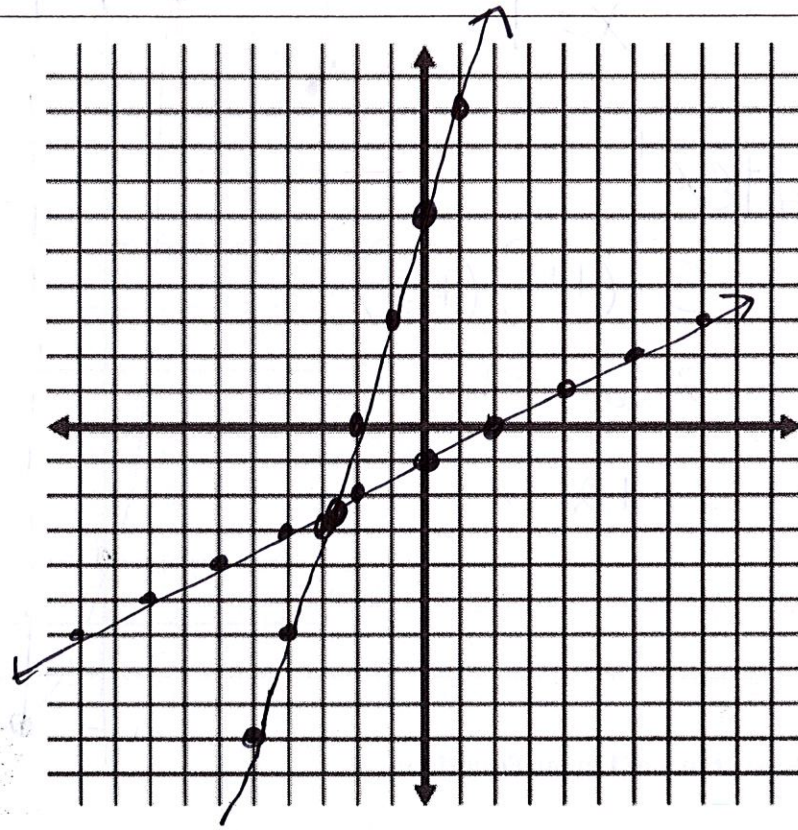
4. How can a system of linear equations have *infinite solutions*?

   If they are the same line! · same slope · same y-int.

5. Solve the system by graphing.

$y = 3x - 6$
$y = \frac{1}{2}x - 1$

Intersection point!



6. Solve the system using substitution.

$2x - y = 7$
$y = 3x + 8$

Be careful:
$2x - 3x + 8 = 7$
No! Use paratheses!

$2x - (3x + 8) = 7$

$2x - 3x - 8 = 7$
$+8 \quad +8$

$-1x = 15$

$x = -15$

Find y

$y = 3(-15) + 8$

$y = -37$

7. Solve the system using elimination.

$6x + 4y = 20$

$6x+4y=20 \longrightarrow \quad 6x+4y=20$

$-3(\,2x + 2y = 12\,) \longrightarrow + \; -6x-6y=-36$

$-2y=-16$

$y=8$

Find x! $2x+2(8)=12$

$2x+16=12$

$2x=-4$

$x=-2$

8. Solve the system using the method of your choice.

$-3(\,2x + 5y = 6\,) \longrightarrow -6x-15y=-18$

$2(\,3x - 2y = 9\,) \longrightarrow 6x-4y=18$

Part 6: Exponential Simplification

1. Simplify the following exponential expressions so that they are in their simplest form.

$x^4x^3 = x^7$	$xy^9xy^2 = x^2y^{11}$	$5x^2(3x) = 15x^3$
$-8x^{-2}y^6(2x^5y) =$ $-16x^3y^7$	$x^{-2} = \frac{1}{x^2}$	$5x^{-3}y^4 = \frac{5y^4}{x^3}$
$2x^{-5}(x^{-2}) =$ $2x^{-7} = \frac{2}{x^7}$	$-5x^8y(x^{-2}y^{-5}) =$ $\frac{-5x^6}{y^4}$	$\frac{x^{10}}{x^3} = x^7$
$\frac{x^3y^4}{xy^2} = x^2y^2$	$\frac{x^2y^3}{x^5y} = \frac{y^2}{x^3}$	$\frac{x^{-1}y^5}{x^3y^{-6}} = \frac{y^{11}}{x^4}$

$8^0 =$ 1	$4x^0y^3 =$ $4y^3$	$5^0 + x^0 =$ 2
$(x^3)^2 =$ x^6	$(x^3y^5)^2 =$ x^6y^{10}	$(3x^5y^{-2})^2 =$ $\frac{9x^{10}}{y^4}$

$\frac{d^3e^7f^{-2}}{d^5e^{-3}f^{-6}}$ $\frac{e^{10}f^4}{d^2}$	$\frac{4a^5c^3}{(3a^{-1}c^4)^3}$ $\frac{4a^8}{27c^9}$

Part 7: Polynomial Operations

Complete each operation. Write your answers in simplified, standard form.

$(w^3 - 2 + w) + (-w - 2 - w^3)$ -4
$(-x^4 + 5x^3 + 6x - 1) + (2x^3 - 6x^2 - 9x + 1)$ $-x^4 + 7x^3 - 3x$
$(-10y^3 + 4y^2 - 7y - 4) - (5y^3 - 5y - 4y^2 + 1)$ $-15y^3 + 8y^2 - 2y - 5$
$3g^3(-5g^2 - 1 + g)$ $-15g^5 - 3g^3 + 3g^4$

$(y + 3)(y - 6)$ $y^2 - 3y - 18$
$(6h^2 + 4)(-h^2 + 9)$ $6h^2(-h^2+9) + 4(-h^2+9)$ $-6h^4 + 54h^2 - 4h^2 + 36$ $-6h^4 + 50h^2 + 36$

Part 8: Factoring Polynomials

What is the difference between *factoring* and distributing?

How can you tell when you have factored a polynomial *completely*?

Factor the following polynomials **completely.**

$a^2 + 9a + 20$

$(a+5)(a+4)$

$3b^2 - 10b + 8$

$(3b-4)(b-2)$

$36n^2 - 25$

$(6n+5)(6n-5)$

$4x^3 - 12x^2 - 40x$

$4x(x^2-3x-10)$

$4x\,(x-5)(x+2)$

$7h^3 - 21h$

$7h(h^2-3)$

$8x^3 - 28x^2 + 4x - 14$ $2(4x^3 - 14x^2 + 2x - 7)$

Part 9: Quadratics

Complete the table with the correct information about the given quadratic equation.

Equation	Does the parabola open **upward** or **downward**?	y-intercept?	Axis of symmetry?	Vertex?
$y = -3x^2 + 12x + 6$	Down	(0,6)	$x = \frac{-12}{2(-3)} = 2$	(2, 18)

List all the different ways you know to *solve* a quadratic equation.

- Square roots (sometimes)
- Factoring (sometimes)
- Complete the square
- Quad formula (if it =0 first!)

What form does a quadratic equation have to be in before you can solve the equation by factoring or by using the quadratic formula?

What form should a quadratic equation be in before you can solve the equation by taking the square root of both sides of the equation?

Solve the following equation two different ways. Show ALL work.

$$x^2 - 3x - 12 = -2$$
$$\underline{\quad +2 \quad +2}$$

Set = 0 !!!

Factoring	Completing the Square	Quadratic Formula
$x^2-3x-10=0$ important $(x-5)(x+2)=0$ $x=5 \quad x=-2$	$x^2-3x-10=0$ even? no... $4x^2-12x-40=0$ $\underline{\qquad\quad +49 \quad +49}$ $\begin{array}{c\|c\|c} & 2x & -3 \\ \hline 2x & 4x^2 & -6x \\ \hline -3 & -6x & \boxed{+9} \end{array}$ $4x^2-12x+9=49$ $\sqrt{(2x-3)^2}=\sqrt{49}$ $2x-3=\pm 7$ $2x-3=7 \qquad 2x-3=-7$ $2x=10 \qquad 2x=-4$ $x=5 \qquad x=-2$	$\frac{3\pm\sqrt{(3)^2-4\cdot1\cdot-10}}{2}$ $\frac{3\pm\sqrt{9+40}}{2}$ $\frac{3\pm\sqrt{49}}{2}$ $\frac{3\pm7}{2}$ $\frac{10}{2} \qquad \frac{-4}{2}$ $\downarrow \qquad \downarrow$ $x=5 \qquad x=-2$

Solve the following equations using the method of your choosing. BOX your answer and show ALL work.

$2x^2 - 36 = x$

$2x^2 - x - 36 = 0$

Grouping!

$\underbrace{2x^2 - 9x}\underbrace{+8x - 36}$

-72: -9, 8, -1

$x(2x-9) + 4(2x-9)$

$(2x-9)(x+4)$

$x = \frac{9}{2}$ $x = -4$

$x^2 - 4x + 4 = 0$ ✓

	x	$+2$
x	x^2	$+2x$
$+2$	$+2x$	4

$\sqrt{(x+2)^2} = \sqrt{0}$

$x + 2 = 0$

$x = -2$

$(x-2)^2 - 9 = 27$

$+9 \quad +9$

$\sqrt{(x-2)^2} = \sqrt{36}$

$x - 2 = \pm 6$

$x = 8 \quad x = -4$

$x^2 + 110 = 10$

$-110 \quad -110$

$\sqrt{x^2} = \sqrt{-100}$

Never!

No solution!

No x-intercepts!